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Introduction

Cardiopulmonary resuscitation (CPR) can save victims of normovolemic cardiac arrest (CA), e.g., ventricular fibrillation. During exsanguination CA from trauma, however, CPR, even with an emergency department (ED) thoracotomy and open chest CPR, doesn't work. *Emergency Preservation and Resuscitation (EPR)* was developed to rapidly preserve the organism during ischemia, using hypothermia, drugs, and fluids, to "buy time" for transport and resuscitative surgery. The purpose of this study is to test the feasibility of rapidly inducing profound hypothermia ($\leq 10^{\circ}\text{C}$) with an aortic flush in trauma victims that have suffered CA and failed standard resuscitative efforts to enable resuscitative surgery and delayed resuscitation with cardiopulmonary bypass. The primary outcome variable will be survival to hospital discharge with minimal neurologic dysfunction.

Body

Scientific Progress

In December, 2009, we conducted the first meeting of the Data and Safety Monitoring Board. The group approved moving forward with the study. They recommended standardization of the transfusion protocols across sites, elimination of blunt trauma victims, and the use of Seldinger technique for aortic cannulation.

Given the complexity of our planned intervention for trauma patients in cardiac arrest, we need to optimize subject inclusion and exclusion criteria. The literature on such patients is scant, with studies focusing on mortality rates and crude information such as signs of life (pulse, breathing, spontaneous movements) in the field or emergency department and admission cardiac rhythm. To better define this patient population to optimize subject selection, we have initiated a retrospective study to look at other factors that could be quickly determined during the resuscitation of a trauma patient in the emergency department. This retrospective study should produce publishable data, although so far we have not obtained sufficient data to make any conclusions.

Separately, to better profile patients who die from trauma, we have initiated a study of the hemorrhagic shock database of the Resuscitation Outcomes Consortium, which studies prehospital care in patients with life-threatening injuries. Within this database, we have identified 67 patients who died of shock within 24 hours of their injuries. We are in the process of analyzing the data for each subject to see if they would have been potential candidates for EPR.

Administrative and Logistic Matters

The first regulatory step for proceeding with this study was to obtain an Investigational Device Exemption (IDE) from the Food and Drug Administration (FDA). Our trial is complicated by the fact that both fluids and equipment are to be used for an application that is not currently approved by the FDA. We have now obtained an investigator-sponsored IDE from the FDA Center for Devices and Radiological Health Office of Device Evaluation.

With the approval of the IDE, we were able to obtain approval for the proposal from the University of Pittsburgh Institutional Review Board (IRB) as both the coordinating center and participating site. We have now completed the community consultation and public disclosure processes. These included the meetings with the Pittsburgh Human Relations Commission and the University of Pittsburgh Center for Minority Health, a random-digit telephone survey, surveys in trauma clinic, town hall meetings at the University Student Union, a website, and publicity in local and national media. The results were presented to the IRB and IRB approval has been granted.

Similarly, the University of Maryland IRB has preliminarily approved the study but they have not completed the community consultation process. The investigators at the University of Pennsylvania had been working on agreements with their administration and their cardiothoracic surgeons regarding participation in the study. At present, these matters preclude their involvement in the study.

Because Drs. Tisherman and Kochanek are co-authors of a submitted patent for EPR Methods, the University of Pittsburgh Conflict of Interest Committee reviewed the plans for the trial and defined a plan to resolve the conflict so that these researchers could still be involved in the study.

Simultaneously, we continued the process of human use approval from the USAMRMC. All the materials have been submitted and approval granted.

Per the recommendation of the DSMB, we have obtained hospital privileges for the trauma surgeons to cannulate for the EPR flush.

Key Research Accomplishments

The most important accomplishments this past year have been completion of the animal and simulation training for the initiation of EPR. We have also worked with the Emergency Department, Operating Room, and Perfusion staff to have all of the necessary equipment available in the Emergency Department.

We have continued to work on gathering the necessary historical data for the study.

Reportable Outcomes

As this year's efforts have focused on the regulatory and training issues, there has not been any new research data to report.

Conclusion

Most of the work so far on this project has been focused on the regulatory and training processes. We have an IDE and approval from 2 IRBs. We also have successfully conducted animal training sessions and a simulation training session. We now need to complete the logistics for equipment and personnel to implement EPR in the Emergency Department. Patient enrollment could begin soon.

References

None